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Short-term outcomes of matching dual diagnosis patients' symptom severity to treatment intensity

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Abstract

This study evaluated a patient-treatment matching strategy intended to improve the effectiveness of hospital-inpatient and community-residential treatment for dual diagnosis patients. Matching variables were the severity of patient disorders and the program's service intensity. Each of three high-intensity hospital programs was paired with a nearby high-intensity community program; there were also four low-intensity pairs. Patients *(N* = 230) were randomly assigned to hospital or community care at intake, and followed at discharge (96%) and at 4 months (90%).

Support was found for the matching strategy at discharge in that severely ill patients treated in high-intensity programs improved more on substance abuse outcomes, and moderately ill patients treated in low-intensity programs improved more on psychiatric outcomes. The benefits of matching held at 4 months in that high-severity patients had better alcohol outcomes when they were treated in high- rather than low-intensity programs. High- and moderate-severity patients did not show differential outcomes in hospital-based or community-based programs. Dual diagnosis patients should be matched by symptom severity with program service intensity, but matching with hospital or community care may not enhance treatment outcomes.

Keywords: Dual diagnosis; Service intensity; Hospital inpatient; Community-residential; Matching

1. Introduction

Increasing numbers of dual diagnosis patients are challenging the limits of health care services, particularly the addiction and psychiatric treatment systems (Burnam et al., 1995; Lehman, Myers, Dixon, & Johnson, 1994). Compared with either substance abuse or psychiatric patients, patients with both problems demonstrate increased service utilization, housing instability and homelessness, and violent and criminal behavior (Drake, Mueser, Clark, & Wallach, 1996; Jerrell & Ridgely, 1995). Services for dual diagnosis patients have been strained by efforts to reduce the number of hospital-based inpatient treatment facilities and lengths of inpatient stays in order to reduce health care costs, as well as by the pressure to provide treatment in less restrictive settings. There has been a shift in the locus of treatment for dual diagnosis patients from hospital-based inpatient to community residential care (Nuttbrock, Rahav, Rivera, Ng-Mak, & Link, 1998; Piette & Fong, 2000).

Historically, dual diagnosis patients have not received adequate services, and so efforts have focused on identifying those patients who require more intensive services and developing and evaluating new treatment programs to ensure that such patients receive appropriate care. However, it is equally important to identify patients who do not require more intensive and more costly interventions (Avants, Margolin, Koston, Rounsaville, & Schottenfeld, 1998). One reason that some patients may not need or benefit from more intensive services is that they are somewhat stable; that is, they have less severe problems despite their substance use and psychiatric disorders. In addition, providing services that are more intensive than some dual diagnosis patients need may inadvertently increase their dependency and hamper their capacity for self-management.

This study evaluated a patient-treatment matching strategy intended to improve the effectiveness of hospital-based and community-based residential treatment for substance abuse patients with psychiatric disorders. Its main objective was to examine whether or not the matching strategy

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resulted in better treatment outcomes at discharge and at a 4-month followup in a sample of patients in Department of Veterans Affairs (VA) programs and community programs under contract to VA. In the evaluation, the patient matching variable was clinical status as measured by the severity of patients' substance use and psychiatric disorders. The treatment matching variable was the program's service intensity, that is, the extent to which health, treatment, and recreational services were offered. A secondary objective was to examine the potential benefits of a matching strategy based on patient severity and the program's location in either a hospital- or community-based setting, independent of its service intensity.

1.1. Program service intensity

Overall, patients with substance use and psychiatric disorders treated in programs with more service intensity have better outcomes than do patients treated in low-intensity programs (Alterman, McLellan, & Shifman, 1993; McLellan, Woody, Luborsky, O'Brien, & Druly, 1983). However, the extent and direction of relationships between treatment program characteristics such as service intensity and treatment outcomes depend on the nature of patients' impairments. Severely disordered substance abuse patients with psychiatric disorders need highly service-intensive treatment programs to compensate for and correct the inadequacy of their own internal controls. Insufficiently service-intensive placements for these patients contribute to repeated relapse, decompensation, and rehospitalization (Mattson et al., 1994; Moos, Schaefer, Andrassy, & Moos, 2001). Moderately disordered dual diagnosis patients tend to do well in programs with a broader range of intensity (Simpson, Joe, Fletcher, Hubbard, & Anglin, 1999). Nonetheless, a program that is rich in services may create a treatment environment so lacking in opportunities for personal control, demand, and challenge, that better-functioning patients respond maladaptively, that is, with continued dependence and high levels of health care utilization (Timko & Moos, 1989; Timko, Nguyen, Williford, & Moos, 1993). As described over 20 years ago (Lerner, 1979), overly intensive treatment may embody countertherapeutic forces that prevent better-functioning patients from developing the very capacities they need to function adequately. Therefore, moderately-severe patients may have better outcomes in programs of low than of high intensity.

Research findings support the hypothesized interactions between dual diagnosis patients' symptom severity and program service intensity. A prospective study matched alcohol- or drug-dependent patients with more severe psychiatric problems to higher-intensity programs, and those having milder psychiatric problems to lower-intensity programs. Compared to mismatched patients, matched patients had better motivation, retention, and 6-month outcomes, and fewer irregular discharges (McLellan et al., 1983). Another study of mental health residential treatment found that poorly-functioning patients who received more services experienced less withdrawal and apathy and more life satisfaction, but that, among well-functioning patients, more services were associated with more withdrawal and apathy and less satisfaction (Timko et al., 1993). Randomized studies of non-residential programs also suggest that more severely ill dual diagnosis patients have better outcomes (e.g., better retention, less substance use) when they receive high-intensity treatment, whereas lower-severity clients benefit more from low-intensity treatment. Results are somewhat stronger for high-severity patients (Avants et al., 1999; Carroll, Rounsaville, Gordon, et al., 1994; Thornton, Gottheil, Weinstein, & Karachsky, 1998).

Dual diagnosis patients of varying symptom severity may differ not only on what level of treatment intensity is beneficial, but also on the domains in which they improve during treatment. Specifically, dual diagnosis inpatients with milder symptoms improved on both substance use and psychiatric outcomes, whereas patients with more severe symptoms improved only on substance use, and not on psychiatric symptoms (Moggi, Ouimette, Finney, & Moos, 1999). In a national study of dually diagnosed veterans' episodes of care, high-severity patients improved more on drug outcomes, but less on psychiatric outcomes, than low-severity patients did when treatment was of longer duration (Timko & Moos, 2002). These findings suggest that the benefits of matching may be most apparent for drug/alcohol outcomes among high-severity patients, and for psychiatric outcomes among moderate-severity patients.

1.2. Program location

This study examined the possibility that patients with moderate substance use and psychiatric disorders may be treated as or more effectively in community residential as in hospital inpatient settings, whereas patients with severe disorders may benefit more from hospital-based treatment. Previous observational and randomized studies comparing hospital to community-based care have not considered matching patients' symptom severity to program location to achieve optimal outcomes. Some of these studies suggest that patients in community residential facilities (CRF) have equally good or superior outcomes (Fenton, Mosher, Herrell, & Blyler, 1998; Hawthorne, Green, Lohr, Hough, & Smith, 1999; Schinka, Francis, Hughes, LaLone, & Flynn, 1998; Sledge, Tebes, Rakfeldt, et al., 1996). In these studies, substance use and psychiatric symptoms decreased from admission to discharge for both hospital and CRF patients, and decreases were generally maintained at short-term followups. The better outcomes of CRFs are thought to derive from a normalizing homelike environment that minimizes stigma and assumption of the sick role while allowing patients to maintain continuity with the community (Rakfeldt et al., 1997).

On the other hand, Moos, Finney, and Moos (2000) found that dual diagnosis patients who entered hospital-based care

had better psychiatric outcomes, but comparable substance use outcomes, to those who entered community-based care. Similarly, Rosenheck and Fontana (2001) reported that the effectiveness of treatment for dual diagnosis patients, assessed in terms of alcohol and drug use and violent behavior at a 4-month followup, declined in programs that converted from an inpatient to a residential treatment model. Hospital care may provide more benefit to more severely ill patients, even when its service intensity is comparable to that of CRF care, because inpatient programs often have a stronger adherence to a specific treatment orientation and provide more integrated treatment plans (Moos, Finney, & Moos, 2000).

To summarize, we hypothesized that patients with severe clinical problems would have better outcomes in programs that were highly service-intensive than in programs with low service intensity, especially in terms of alcohol and drug use. In contrast, patients with moderate clinical problems should have similar or even better outcomes in programs with low service intensity than in highly service-intensive programs, particularly on psychiatric outcomes. In addition, moderate-severity patients in CRFs should have comparable or superior outcomes to similar patients in hospital programs, whereas high-severity patients in hospital settings may have superior outcomes to similar patients in CRFs.

2. Materials and methods

2.1. Site selection

To select data collection sites, a survey was conducted of all 406 inpatient substance abuse and psychiatric treatment programs in the VA nationwide (Timko, Lesar, Calvi, & Moos, 2003). Completed surveys were received from 383 (95%) program managers. In addition, a survey was conducted of 321 CRFs that contracted with the VA to provide treatment services for veterans and also provided services to non-veterans (Timko, Lesar, Engelbrekt, & Moos, 2000); 299 (93%) managers completed this survey.

As part of the surveys, programs were rated on *Service Intensity*, which is a measure taken from the Residential Substance Abuse and Psychiatric Programs Inventory, assessing the availability of 31 health and treatment services and 10 social-recreational services within the program (Timko, 1995; Timko, Lesar, Engelbrekt, & Moos, 2000). The measure's summed scores were converted to percentage scores, which ranged from 5% to 100% (Cronbach's alpha = .81). Each hospital program and CRF was classified as high-intensity or low-intensity (see Table 1).

We selected and recruited three high-intensity hospital programs that (1) admitted at least three dual diagnosis patients per month, and (2) were in a hospital that contracted with a CRF which was also of high intensity. We also recruited 4 low intensity hospital program and CRF pairs.

Table 1
Treatment program classification on service intensity

High Service Intensity programs:
Scored above the Service-Intensity median (72.8%) of a national hospital sample

Low Service Intensity programs:
Scored below the Service-Intensity median

High Service-Intensity programs were more likely to have:

Substance abuse services	*Rehabilitation services*
Detoxification	Daily living skills training
Self-help groups	Social skills training
	Vocational counseling
Psychiatric services	Work therapy
Psychiatrist, psychologist hours	Occupational therapy
Pharmacotherapy	
	Social-recreational services
Counseling services	Exercise, physical fitness
Couples/family counseling	Organized recreation
Psychoeducation for patients	Films, movies
Psychoeducation for families	Social hours
Religious counseling	Clubs
Peer counseling	

2.2. Procedures

Project participants were veterans who applied for substance abuse treatment at the facilities in which the seven hospital programs were located. All participants signed an informed consent form after receiving a complete description of the study. They were evaluated with the Addiction Severity Index (ASI; McLellan et al., 1992) during an initial period of stabilization.

The ASI is a structured, 40-min clinical research interview that assesses seven problem areas, three of which are reported here: alcohol abuse, drug abuse, and psychiatric. In each area, two kinds of scores are produced: *Severity* ratings represent global clinical judgments of the patient's problems, and *Composites* represent a summary of specific indices that reflect the patient's status at baseline and outcome.

The 10-point severity ratings are used for initial treatment planning and referral, and provide valid, reliable (i.e., internally consistent, consistent across testing occasions and raters), and clinically useful estimates of problem severity (McLellan et al., 1985; Timko & Moos, 2002). In each domain, severity ratings can be broken down as: 0–1 = no real problem, treatment not indicated; 2–6 = moderate problem, treatment indicated; 7–9 = considerable to extreme problem, treatment necessary. To be eligible for random assignment, patients were required to have at least moderate substance abuse and psychiatric problems (see Table 2). Consenting patients who were eligible for the study were randomly assigned to hospital or CRF placement.

Not all patients randomly assigned to the CRF were placed there. This occurred because VA facility funds for

Table 2
Patient Eligibility Criteria and Classification on Symptom-Severity

To be **eligible** for random assignment, patients scored:
(1) ≥ 2 on alcohol *and/or* drug abuse ASI severity ratings, AND
(2) ≥ 2 on psychiatric ASI severity ratings and were clinically evaluated as not a danger to themselves or others.

To be **classified as high-severity,** patients scored:
(1) ≥ 7 on the alcohol *and/or* drug abuse ASI severity ratings, AND
(2) ≥ 7 on the psychiatric ASI severity ratings

To be **classified as moderate-severity,** patients scored:
(1) < 7 on the alcohol *and* drug abuse ASI severity ratings, AND/OR
(2) < 7 on the psychiatric ASI severity ratings

CRF contracts in a particular fiscal year were completely expended for intervals up to several months before the fiscal year ended, and therefore project participants could not be sent to the CRF. As in previous comparisons of hospital and community care (Boardman, Hodgson, Lewis, & Allen, 1999), when patients were randomly assigned to the CRF, but a CRF bed was not available (due to a temporary lack of funds), patients were retained in the study and remained in the hospital program. These patients were retained because they had been compliant with random assignment procedures (Staines, McKendrick, Perlis, Sacks, & De Leon, 1999; Ward, King, Lloyd, Bower, & Friedli, 1999).

2.3. Participants

Of 263 potential participants, 230 (87.5%) provided informed consent and met eligibility criteria and so received a random assignment. Based on procedures by Timko and Moos (2002), patients were classified as moderate-severity when they had moderate problems in either the substance abuse or the psychiatric domains, or in both domains, or as high-severity when they had considerable problems in either the substance abuse or psychiatric domains or in neither domain (see Table 2).

Most of the 230 participants were men (96.5%). At intake, on average, participants were 45.4 years old *(SD* = 7.0). The majority were white (48.7%) or African American (47.0%). Only 22.6% were married. On average, participants had completed 12.8 years of education *(SD* = 1.9) and most were employed (68.7%) and lived with family or friends (57.0%). In the month prior to treatment, the average income was $918 *(SD* = $1,716).

In their medical record, patients had from one to four substance use diagnoses (mean number = 1.70, *SD* = .77). Most commonly, patients had abuse/dependence of alcohol alone (33%), alcohol and cocaine (20%), cocaine alone (10%), or alcohol, cocaine, and cannabis (8%). Patients had from one to three psychiatric diagnoses *(M* = 1.08, *SD* = .28), which were most commonly major depression (19%), bipolar (16%), post-traumatic stress disorder (11%) or another anxiety disorder (11%), schizophrenia (8%), and dysthymia (8%). On average, patients had been treated (inpatient, residential, and/or outpatient) 2.8 *(SD* = 3.8) previous times for substance abuse problems, and 4.6 *(SD* = 8.1) times for psychiatric problems.

2.4. Followup assessments

Patients were followed at program termination, that is, at discharge or upon leaving against medical advice (98%), and at 4 months (90%). They were assessed with the ASI at each followup, yielding composite scores in each of the three problem areas. The composite scores are produced from sets of objective items that measure the number, extent, and duration of problem symptoms in the patient's lifetime and in the past 30 days; they are standardized and summed (McLellan et al., 1992) and range from 0 to 1.

3. Results

3.1. Overview of analyses

3.1.1. Patient severity and program intensity

We begin by presenting results of paired t-tests to examine change on each ASI composite from baseline to discharge, and discharge to the 4-month followup, within each of four patient groups based on patient severity and program service intensity: high-severity patients in high-intensity (n = 63) or low-intensity programs (n = 35), and moderate-severity patients in high-intensity (n = 47) or low-intensity programs (n = 85). Then, we present results of a set of Analyses of Covariance (ANCOVA) in which patient severity (moderate or severe) and program intensity (low or high) were independent variables, and discharge or 4-month ASI composites were dependent variables. Comparisons of baseline sociodemographic characteristics between patients with moderate or severe symptoms, and between patients in high- or low-intensity programs, as well as between patients in hospital or CRF programs, yielded one difference: patients in CRFs were more likely to be white than were patients in hospital programs (64.9% vs. 43.4%; χ^2 (3) = 8.1, p < .01). Therefore, race was a covariate, as was the intake value of the dependent variable. When significant interaction effects were found, group means were compared using multivariate ANCOVAs.

3.1.2. Patient severity and program location

We used paired t-tests to examine change on each ASI composite from baseline to discharge, and discharge to the 4-month followup, within each of four patient groups based on patient severity and program location: high-severity patients in hospital programs (n = 82) or CRFs (n = 16), and moderate-severity patients in hospital programs (n = 91) or CRFs (n = 41). In a second set of ANCOVAs, patient severity and program location (hospital or CRF) were independent variables, with the same outcomes and covariates as in the first set. We could not

conduct three-way ANCOVAs using patient severity, program intensity, and program location as independent variables due to the small number of patients in some cells. On the ASI composites, higher scores indicate poorer outcomes.

3.2. Patient severity and program intensity

3.2.1. Patient improvement

The t-tests showed that, between intake and discharge, all four patient groups—high-severity/high-intensity, high severity/low-intensity, moderate-severity/high-intensity, and moderate-severity/low-intensity— improved on the domains of alcohol, drugs, and psychiatric functioning ($p < .05$) with one exception: high-severity patients in low-intensity programs did not improve on psychiatric outcomes. Between discharge and the 4-month followup, high-severity patients in both low-intensity and high-intensity programs improved on alcohol and psychiatric outcomes ($p < .05$). In addition, high-severity/ low-intensity patients continued to improve on ASI drug outcomes ($p < .05$). In contrast, moderate-severity patients in either high- or low-intensity programs did not change on the ASI indices between discharge and the 4-month followup.

3.2.2. Program differences in outcomes at discharge

The ANCOVAs conducted on the ASI composites at discharge found one significant main effect for patient severity. On the drug composite, moderate-severity patients had better outcomes ($M = .077$, $SD = .094$) than did high-severity patients ($M = .123$, $SD = .097$; $F = 7.39$, $p < .01$). The ANCOVAs found a significant main effect for the program's service intensity on the alcohol composite ($F = 6.35$, $p < .01$) and the drug composite ($F = 14.75$, $p < .001$). Specifically, patients in high-intensity programs had better alcohol outcomes ($M = .236$; $SD = .178$) and drug outcomes ($M = .085$; $SD = .078$) than did patients in low-intensity programs (for alcohol, $M = .275$, $SD = .273$; for drugs, $M = .109$, $SD = .112$).

The ANCOVA results supported hypotheses regarding interactions of patient severity by program intensity. There was a significant interaction effect on the alcohol composite ($F = 12.02$, $p < .001$), the drug composite ($F = 4.98$, $p < .05$), and the psychiatric composite ($F = 3.81$, $p < .05$). As expected, matched patients had better outcomes than did mismatched patients. That is, high-severity patients in high-intensity programs had better alcohol outcomes and drug outcomes at discharge than did high-severity patients in low-intensity programs (group means are in Table 3). In the case of the psychiatric composite, high-severity patients' outcomes were comparable in high-intensity or low-intensity programs. Moderate-severity patients did as well in low-intensity as in high-intensity programs on alcohol outcomes and on drug outcomes. Regarding psychiatric functioning, moderate-severity patients in low-intensity programs had better outcomes at discharge than did moderate-severity patients in high-intensity programs.

Table 3
Means of ASI Composites and items for high- and moderate-severity patients in high- or low-intensity programs

	High-severity patients Service intensity		Moderate-severity patients Service intensity	
ASI Composite	*High* ($N = 65$)	*Low* ($N = 35$)	*High* ($N = 47$)	*Low* ($N = 85$)
Alcohol				
Discharge	.207	.389	.275	.228
4 months	.148	.233	.206	.179
Drugs				
Discharge	.103	.162	.060	.087
4 months	.091	.108	.050	.066
Psychiatric				
Discharge	.503	.498	.460	.297
4 months	.385	.385	.411	.323
Number of days (in past 30):				
Used alcohol to intoxication				
Discharge	.88	5.80	.73	2.83
4 months	.50	3.12	1.67	1.57
Use drugs				
Discharge	3.09	14.60	1.69	3.72
4 months	7.48	12.48	2.28	4.64
Experienced psychological problems				
Discharge	12.11	18.27	12.63	9.86
4 months	9.48	13.93	13.95	10.03

3.2.3. Number of problem days

To help understand these results, we conducted the same analyses on three ASI items assessing the numbers of days patients had alcohol, drug, and psychiatric problems (see Table 3). Each of the three ANCOVAs showed a significant interaction of severity by intensity ($F = 4.69$, 11.91, and 4.61 for alcohol, drug, and psychological problems, respectively; all $p < .05$). High-severity patients in high-intensity programs reported fewer days of alcohol and of drug use, and fewer days of psychological problems, at discharge than did high-severity patients in low-intensity programs (group means are in Table 3). Moderate-severity patients had comparable numbers of days of alcohol and drug use in low-intensity as in high-intensity programs. Moderate-severity patients in high-intensity programs reported more days of psychological problems than did moderate-severity patients in low-intensity programs.

3.2.4. Program differences in outcomes at 4 months

At the 4-month followup, there was a main effect for patient severity on the ASI drug composite such that moderate-severity patients were better off ($M = .077$, $SD = .094$) than high-severity patients ($M = .123$, $SD = .097$; $F = 10.05$, $p < .01$). There was also a significant interaction effect for patient severity by program intensity on the alcohol composite ($F = 3.97$, $p < .05$). High-severity patients in high-intensity programs had better alcohol outcomes at the 4-month followup than did high-severity patients in low-intensity programs, whereas moderate-severity patients had comparable alcohol outcomes in high- or low-intensity programs (group means are in Table 3). Otherwise, there

were no main or interaction effects on the ASI composites at 4 months.

3.2.5. Number of problem days

The ANCOVAs conducted on number of days of alcohol, drug, or psychological problems at the 4 month followup found a significant interaction of severity by intensity for alcohol use ($F = 3.52$, $p < .05$) and psychiatric problems ($F = 3.28$, $p < .05$). High-severity patients in high-intensity programs had fewer days of alcohol use, whereas moderate-severity patients had equivalent alcohol use regardless of program intensity (see Table 3 for group means). In addition, high-severity patients in high-intensity programs reported fewer days of psychological problems than did high-severity patients in low-intensity programs (Table 3). Moderate-severity patients in high-intensity programs reported more days of psychological problems than did moderate-severity patients in low-intensity programs.

3.3. Patient severity and program location

3.3.1. Patient improvement

The t-tests comparing intake to discharge showed that all four patient groups—high-severity/hospital, high-severity/CRF, moderate-severity/hospital, and moderate severity/CRF— improved on the ASI domains of alcohol, drugs, and psychiatric functioning ($p < .05$). Only high-severity patients in hospital programs continued to improve between discharge and the 4-month followup. These patients improved on the ASI alcohol, drug, and psychiatric indices ($p < .05$).

3.3.2. Program comparisons on outcomes at discharge

On the ANCOVAs, at discharge, no effects were found for patient severity. There was a significant effect for program location on the alcohol ($F = 15.58$, $p < .001$) and drug ($F = 7.82$, $p < .01$) composites such that patients in CRFs had better outcomes on average than did patients in hospital programs (for alcohol, CRF $M = .198$, $SD = .204$ vs. hospital $M = .272$, $SD = .237$; for drugs, $M = .078$, $SD = .076$ vs. .102, $SD = .103$). There were no interactions of patient severity by program location on the ASI scores (group means are shown on Table 4).

Table 4
Means of ASI Composites for high- and moderate-severity patients in hospital or community programs

	High-severity patients Location		Moderate-severity patients Location	
ASI Composite	*Hospital* ($N = 82$)	*CRF* ($N = 16$)	*Hospital* ($N = 91$)	*CRF* ($N = 41$)
Alcohol				
Discharge	.289	.165	.256	.213
4 months	.156	.260	.182	.204
Drugs				
Discharge	.131	.081	.077	.077
4 months	.101	.124	.055	.060
Psychiatric				
Discharge	.500	.508	.386	.269
4 months	.362	.517	.343	.372

3.3.3. Program comparisons on outcomes at 4 months

At the 4-month followup, there was a main effect for patient severity on the drug composite ($F = 7.46$, $p < .01$) such that moderate-severity patients were better off ($M = .057$, $SD = .077$) than were high-severity patients ($M = .105$, $SD = .097$). A main effect for location showed that patients who had been in hospital programs had better psychiatric outcomes ($M = .352$, $SD = .272$) than did patients who had been in CRFs ($M = .411$, $SD = .242$; $F = 4.01$, $p < .05$). There were no significant interactions of patient severity by program location on the ASI composites at the 4-month followup (Table 4).

4. Discussion

This study found support for the matching strategy based on patient severity and program service intensity. At discharge, severely ill dual diagnosis patients improved more on substance use outcomes when they were treated in high-intensity programs, and moderately ill patients improved more on psychiatric outcomes when they were treated in low-intensity programs. Severely ill patients continued to show better alcohol-related outcomes at the 4-month followup when they received high- rather than low-intensity treatment. Both severely and moderately ill patients fared as well in community-based as in hospital-based programs; that is, in particular, high-severity patients did not benefit from placement in a hospital setting.

4.1. Program intensity and patient severity

Patients improved more at discharge on alcohol and drug abuse outcomes when they were treated in high-intensity rather than low-intensity programs, even when patients' functioning at intake was considered. However, the benefits of high-intensity programs did not extend to the 4-month followup. Other research also reported that dual diagnosis patients who received enhanced services had better casemix-adjusted clinical outcomes (Alterman et al., 1993; Moos, Finney, Federman, & Suchinsky, 2000; Timko & Moos, 2002), but that the relative advantages of more intensive treatment diminish somewhat over time (Bartels & Drake, 1996; Conrad et al., 1998).

The findings provide support for the proposed matching strategy. This support is noteworthy in light of the methodological decision not to restrict patient selection just to those at the extreme ends of the symptom severity continuum. We found that dual diagnosis patients who had severe symptoms at intake improved more on alcohol and drug abuse outcomes at discharge and showed superior

alcohol outcomes at the 4-month followup when they received treatment in programs providing a high, rather than low, intensity of services. In fact, matched high-severity patients had better alcohol composite scores than did mismatched moderate-severity patients (Table 3). High-severity patients also had fewer days of psychiatric problems at both followups when the treatment they received was of high-intensity. Previous studies support the finding that patients with more severe problems benefit from more intensive treatment (McLellan et al., 1983; Moos et al., 2001).

Only high-severity patients treated in low-intensity programs failed to improve on the overall psychiatric composite during treatment, although they improved on substance use outcomes during this period. Research on dose-response relationships in psychotherapy indicates that disorder-specific symptoms, such as alcohol and drug abuse, improve prior to functional status, including psychiatric adaptation (Barkham et al., 1996; Howard, Lueger, Maling, & Martinovich, 1993). Moggi et al. (1999) suggested that treatment programs need to be as effective with severely ill dual diagnosis patients at teaching general coping skills (i.e., taking actions to resolve life stressors such as psychological dysfunction) as they already are in imparting substance use-specific coping skills (i.e., resisting the temptation to use alcohol and drugs). Severely ill dual diagnosis patients can learn general coping skills when treatment programs are invested in teaching them (Hoffman, DiRito, & McGill, 1993).

In contrast to dual diagnosis patients with only moderate symptoms, high-severity patients showed continued improvement between discharge and the 4-month followup on substance use and psychiatric outcomes. Possibly, high-severity patients received more aftercare services, which are associated with better community adjustment (Fontana & Rosenheck, 1996; Moos, Finney, Federman, & Suchinsky, 2000). For many dual diagnosis patients, recovery may require a slow process of learning a sober and functional lifestyle that cannot be accomplished by intensive treatment alone (Drake et al., 1996). There is growing evidence that self-help group participation during and following treatment may facilitate dual diagnosis patients' progress on gains from formal care (Kurtz et al., 1995; Ouimette, Gima, Moos, & Finney, 1999; Pristach & Smith, 1999).

Consistent with the matching hypothesis, the improvement on substance abuse outcomes of moderate-severity patients was similar whether they were treated in low- or high-intensity programs. Moreover, moderate-severity patients improved more in the psychiatric domain when they were treated in low-intensity programs. McLellan et al. (1983) also found patients with less severe symptoms to achieve better treatment outcomes in lower-intensity substance abuse programs. Better-functioning patients in high-intensity programs may relinquish self-management to staff and thus begin to lose these skills (Timko & Rodin, 1985). A greater intensity of program services is exchanged to some extent for patients' personal autonomy in managing the setting and the competence to assume responsibility for one's own well-being (Timko, Yu, & Moos, 2000). Moos (1997) noted that programs with a narrower set of health and treatment services may be more oriented toward the formation of expressive relationships and open exchange of feelings. In turn, high expectations for interpersonal interaction may be associated with more positive psychiatric outcomes for moderately ill patients, although they create difficulties for severely ill patients (Litt, Babor, Delboca, Kadden, & Cooney, 1992; Project MATCH Research Group, 1997).

4.2. Program location

Compared to patients in hospital programs, patients in CRFs had better drug and alcohol outcomes at discharge, but poorer psychiatric outcomes at the 4-month followup. Again, these results held when intake functioning was controlled. In comparison to hospital programs, community settings tend to have treatment climates that emphasize the open expression of personal feelings by patients and staff, and are somewhat more supportive and directed, which may facilitate initial abstinence (Moos, 1997).

The better psychiatric outcomes of hospital patients at 4 months may be explained in part by the subsidiary finding that these patients were significantly more likely to complete treatment than were CRF patients (80% vs. 54%; χ^2 (1) = 12.84, $p < .001$). The dose-response psychotherapy research mentioned earlier (Barkham et al., 1996; Howard et al., 1993) suggests that treatment completion should be associated with better psychiatric adaptation. In addition, effectiveness studies with substance abuse patients have found that the benefits of psychological treatment may be delayed (Carroll, Rounsaville, Gordon, et al., 1994; Carroll, Rounsaville, Nich, et al., 1994). That is, opportunities to implement generalized coping skills imparted during treatment may appear mainly after patients return to the community. In this study, hospital patients' higher completion rates may have served to increase the durability and persistence of coping skills taught as part of treatment.

Although the benefits of hospital-based relative to community-based treatment were not consistent across followups, it is important to point out that there were no severity-by-location interaction effects at either followup. That is, both high- and moderate-severity dual diagnosis patients were treated as effectively in community-residential as in hospital-based programs. These findings may not hold for patients who are more severely ill than those considered for this study (i.e., a danger to themselves or others) and therefore are not clinically eligible for treatment in community programs. Nevertheless, studies have found that the majority of substance abuse and psychiatric patients are eligible for community-based care, and also that community residential care is less costly than hospital inpatient care (Fenton, Hoch, Herrell, Mosher, & Dixon, 2002; Sledge, Tebes, Wolff, & Helminiak, 1996). Findings that patient

outcomes are similar between the two systems suggest that cost savings can be achieved without loss of short-term benefit to patients by the shift from hospital to community care.

4.3. Limitations and implications

The findings must be considered in light of the fact that, although study participants were spread throughout the United States, all of the patients were treated either within VA hospitals or within community programs that accepted veteran as well as non-veteran patients. Studies comparing mental health care within and outside the VA suggest that VA-based findings may generalize somewhat better to non-profit than to for-profit settings (Calsyn, Saxon, Blaes, & Lee-Meyer, 1990; Rodgers & Barnett, 2000), although generally, mental health services in the VA are of similar quality and effectiveness to those in the private sector (Rosenheck, Desai, Steinwachs, & Lehman, 2000). The VA patient population has poorer health status compared with the general patient population (Agha, Lofgren, VanRuiswyk, & Layde, 2000), and so the extent to which our findings will be replicated in studies of patients with more health and social resources and in other health care systems remains to be determined.

Managers of substance abuse and psychiatric services can incorporate these findings in efforts to enhance the therapeutic effectiveness of programs for moderate- and high-severity dual diagnosis patients. Dual diagnosis patients with severe symptoms should receive high-intensity services to improve, in particular, their alcohol problems; most likely, reducing patients' alcohol abuse and dependence will lead to improvements in other aspects of their life contexts, such as diminished legal and family problems (Moos, Finney, & Moos, 2000; Timko & Moos, 2002). Future research should determine the extent to which providing high-intensity treatment that teaches general coping skills, along with continuing care, improves the effectiveness as well as the cost-effectiveness of treatment for high-severity patients. That is, providing such a service "package" initially may reduce the subsequent use of more costly services.

Mental health system planners may also consider reducing the intensity and therefore the costs of providing treatment for patients with moderate substance abuse and psychiatric problems. Placing moderately ill dual diagnosis patients in low-intensity rather than high-intensity programs has the potential for significant cost savings, as we found that the average treatment episode cost $6,977 for moderately ill patients in high-intensity programs, vs. only $3,306 for moderately ill patients in low-intensity programs (Timko, 2003). In this study of inpatient and residential care, the programs classified as low-intensity were most likely more service-intensive and costly than are many other substance abuse and psychiatric care options. If the most cost-effective programs for moderately-disturbed patients prove to involve relatively low levels of services, treatment costs may be reduced by targeting a specific range of services for these higher-functioning patients.

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